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Critically Appraised Paper for “Effect of physical exercise-movement strategies programme on mobility, falls, and quality of life in Parkinson's disease”

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AOTA Critically Appraised Papers Series

Evidence Exchange

**A product of the American Occupational Therapy Association's Evidence-Based Literature Review Project*

CRITICALLY APPRAISED PAPER (CAP)

Ehab, G., Barnsley, S., & Chellappa, R. (2012). Effect of physical exercise–movement strategies programme on mobility, falls, and quality of life in Parkinson's disease. *International Journal of Therapy & Rehabilitation*, 19(2), 88–96. <https://doi.org/10.12968/ijtr.2012.19.2.88>

CLINICAL BOTTOM LINE

A research team conducted a Level III prospective, longitudinal study to examine the effect of a standardized rehabilitation program, consisting of regular exercise and movement strategies, on fall risk, mobility, hospitalization, and quality of life for individuals with idiopathic Parkinson's disease (PD). Over 2 years, 15 participants attended weekly rehabilitation sessions during Year 1 and biweekly sessions during Year 2. The rehabilitation program was designed to improve cardiovascular fitness, strength, flexibility, balance, posture, and gait pattern. Using a pre- and posttest study design, the research team assessed participants at baseline and at Year 1 and Year 2 follow-up evaluations. Using the Tinetti fall risk assessment, the research team found significant fall risk reduction between baseline measures and Year 1 follow-up measures. The Parkinson's Disease Questionnaire (PDQ-39) indicated a significant improvement in the following areas: quality of life, mobility, activities of daily living (ADLs), emotional well-being, social support, and communication. Year 1 follow-up analyses demonstrated an 80% decrease in hospital admission compared with baseline. On the contrary, Year 2 follow-up measures showed that the rehabilitation program had limited impact on the number of falls. In addition, at Year 2, the PDQ-39 only displayed improvements in mobility, gait-freezing ADLs, and communication. Last, the Year 2 follow-up only reported a 60% reduction in hospital admission, compared with 80% reduction in Year 1.

Clinical implications of this study suggest that a weekly exercise program involving movement therapy may best influence falls, balance, and mobility, thereby improving quality of life for individuals with PD. The validity and generalizability of this study are threatened by the following design factors: absence of a control group, inadequately

powered sample size, limited bias control, and timing of intervention to account for progression of PD. Nevertheless, results from this study support that a combination of regular exercise and movement strategies, conducted on a weekly basis, may demonstrate functional improvement on fall risk, balance, and functional mobility in support of ADL completion, thereby improving overall quality of life for individuals with PD. Occupational therapists can use this tailored intervention approach to support successful engagement in meaningful occupations.

RESEARCH OBJECTIVE(S)

Examine the effect of a standardized rehabilitation program, consisting of regular exercise and movement strategies, on fall risk, mobility, hospitalization, and quality of life for individuals with idiopathic PD

DESIGN TYPE AND LEVEL OF EVIDENCE

Level III: Prospective, longitudinal design

PARTICIPANT SELECTION

How were participants recruited and selected to participate?

The participants were recruited from a rehabilitation program at the National Health Service Community Hospital, South England. The hospital's consultant neurologist and Parkinson's specialist nurse then referred participants to a rehabilitation team, who conducted the study.

Inclusion criteria:

Idiopathic PD severity of I–IV on the Hoehn and Yahr Scale, ability to ambulate independently indoors with or without an assistive device, and lack of any other neurological problems or severe comorbidities that were likely to affect participation

Exclusion criteria:

Other significant comorbidities or neurological problems that affected ability to engage in rehabilitation sessions

PARTICIPANT CHARACTERISTICS

N =	15
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#/ % Male:	7/(46.67%)	#/ % Female:	8/(53.33%)
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Ethnicity:	Not reported
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Disease/disability diagnosis:	Idiopathic PD
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INTERVENTION AND CONTROL GROUPS

Group 1: Intervention group

Brief description of the intervention	Intervention incorporated a standardized rehabilitation program focusing on improving cardiovascular fitness, strength, flexibility, balance, posture, and gait pattern. The rehabilitation program consisted of two parts: a standardized mat- and chair-based exercise program, and movement-strategy training for gait improvement and reduction of gait freezing and fall risk. The second part of the intervention used cueing principles and cognition- and attention-strategy training adapted from the Association of Physiotherapists in Parkinson's Disease Europe's DVD.
How many participants in the group?	15
Where did the intervention take place?	National Health Service Community Hospital in Southern England
Who delivered?	A single multidisciplinary team (neurological physiotherapist, occupational therapist, and technical instructor)
How often?	Year 1: 1 90-minute session weekly for 1 year Year 2: 1 90-minute session biweekly for 1 year
For how long?	2 years

INTERVENTION BIASES

Contamination:

YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	<i>Explanation:</i> Contamination is not possible with a single-group design.
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Co-intervention:

YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	<i>Explanation:</i> The researchers did not control participants' mobility and activity levels and did not regulate participants' medical or rehabilitation services over the 2-year duration of the study.
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Timing of intervention:

YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	<i>Explanation:</i> The normal aging process and the progressive nature of PD could have affected the outcome measures, given the 2-year duration of the study.
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Site of intervention:

YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	<i>Explanation:</i> Intervention site remained consistent throughout the intervention.
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Use of different therapists to provide intervention:

YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	<i>Explanation:</i> The intervention was implemented by a single multidisciplinary team.
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Baseline equality:

YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	<i>Explanation:</i> All baseline measurements were administered at the same time. However, varying clinical presentation created baseline equality bias and might have affected overall outcome measures at Year 1 and Year 2 follow-ups.
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MEASURES AND OUTCOMES

Measure 1: PDQ-39

Name/type of measure used:	PDQ-39, a self-administered outcome measure using a 5-point Likert scale
What outcome is measured?	Measured outcomes are functional status, well-being, and overall health of individuals with PD. Outcomes consist of 39 specific items that assess eight dimensions: mobility, ADLs, emotional well-being, stigma, social support, cognition, communication, and bodily discomfort.

Is the measure reliable (as reported in the article)?	YES <input type="checkbox"/> NO <input type="checkbox"/> Not Reported <input checked="" type="checkbox"/>
Is the measure valid (as reported in the article)?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Not Reported <input type="checkbox"/>
When is the measure used?	At baseline before intervention, at Year 1 follow-up, and at Year 2 follow-up

Measure 2: New Freezing of Gait Questionnaire

Name/type of measure used:	New Freezing of Gait Questionnaire
What outcome is measured?	This measure has three parts. Part 1 establishes the presence of gait freezing. Part 2 determines the severity of freezing in terms of duration and frequency. Part 3 identifies the impact gait freezing has on daily life and functional activities.
Is the measure reliable as reported in the article?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Not Reported <input type="checkbox"/>
Is the measure valid as reported in the article?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Not Reported <input type="checkbox"/>
When is the measure used?	At baseline before intervention, at Year 1 follow-up, and at Year 2 follow-up

Measure 3: Tinetti falls risk assessment tool

Name/type of measure used:	Tinetti falls risk assessment tool
What outcome is measured?	Individual fall risk, based on performance of balance and gait tasks
Is the measure reliable as reported in	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Not Reported <input type="checkbox"/>

the article?	
Is the measure valid as reported in the article?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Not Reported <input type="checkbox"/>
When is the measure used?	At baseline before intervention, at Year 1 follow-up, and at Year 2 follow-up

Measure 4: Self-reported fall history

Name/type of measure used:	Self-reported fall history
What outcome is measured?	Individual fall history
Is the measure reliable as reported in the article?	YES <input type="checkbox"/> NO <input type="checkbox"/> Not Reported <input checked="" type="checkbox"/>
Is the measure valid as reported in the article?	YES <input type="checkbox"/> NO <input type="checkbox"/> Not Reported <input checked="" type="checkbox"/>
When is the measure used?	At baseline before intervention, at Year 1 follow-up, and at Year 2 follow-up

MEASUREMENT BIASES

Were the evaluators blind to treatment status?

YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	<i>Explanation:</i> Blinding is not possible with a single-group design. The same treatment and evaluation team conducted both baseline and outcome measures, in addition to implementing Year 1 and Year 2 interventions.
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Was there recall or memory bias?

YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	<i>Explanation:</i> Outcome measures included the PDQ-39 and fall self-report for baseline measures and at Year 1 and Year 2 follow-up evaluations. The 1-year duration between follow-up evaluations might have caused recall bias, affecting the accuracy of self-reported
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	measures for the PDQ-39 and fall history.
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Other measurement biases:

N/A

RESULTS

List key findings based on study objectives

Year 1 Follow-Up

The number of falls at the Year 1 follow-up was statistically significant ($p = .041$), with 53% of participants reporting zero falls that year. Data analysis showed significant change in fall risk ($p = .018$) and gait freezing ($p = .005$). Statistically significant differences between baseline and Year 1 PDQ-39 measures confirmed improvement in participants' quality of life, mobility, ADLs, social support, emotional health, and communication. Data showed no impact on walking-aid use or need for caregiver assistance. The researchers reported that the rehabilitation program had the greatest impact on hospital admission. Although the finding was not statistically significant, hospital admission was reduced by 80% compared with baseline measures.

Year 2 Follow-Up

Data analysis between baseline and Year 2 follow-up showed no significant difference ($p = .26$) in number of falls. Only 40% of the participants reported zero falls during Year 2 follow-up, compared with 53% of participants at Year 1 follow-up. Although data showed a significant increase in fall risk between Year 1 and Year 2 follow-ups, analysis reported a significant reduction in fall risk between baseline and Year 2 follow-up ($p = .05$). Compared with baseline measures, Year 2 follow-up measured significant differences in mobility, gait freezing, ADLs, and communication. Data showed no significant change in walking-aid use, need for caregiver assistance, or hospitalization.

Was this study adequately powered (large enough to show a difference)?

YES <input type="checkbox"/>	<i>Explanation:</i> The sample only included 15 participants over the 2-year duration of the study.
NO <input checked="" type="checkbox"/>	

Were the analysis methods appropriate?

YES <input checked="" type="checkbox"/>	<i>Explanation:</i> All reported data analysis methods were appropriate and aligned with research objectives to measure results at Year 1 and Year 2 follow-ups. Chi-square was used to compare the need for assistance,
NO <input type="checkbox"/>	

	hospitalization, or consultant visit. The Wilcoxon signed rank test was used to compare number of falls, falls risk, gait freezing, and quality of life. McNemar's test was used to compare the number of fallers and nonfallers.
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Were statistics appropriately reported (in written or table format)?

YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	<i>Explanation:</i> Statistics were reported in both narrative and table format to compare the following characteristics: walking-aid use, need for caregiver assistance, number of falls, gait freezing, hospitalization percentage, fallers and nonfallers, and Tinetti and PDQ-39 scores.
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Was participant dropout less than 20% in total sample and balanced between groups?

YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	<i>Explanation:</i> No reported dropout in the sample group
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What are the overall study limitations?

Limitations of this study include the following: absence of a control group, inadequately powered sample, limited bias control, and timing of intervention. The study did not use a control group because of its longitudinal, pre- and posttest design, in which all participants received Year 1 and Year 2 interventions. However, without a control group, it is difficult to determine whether the intervention alone affected the outcomes. Second, the sample only included 15 participants throughout the 2-year duration of the study. Limited variability in sample group challenges internal and external validity as well as generalizability of the study. Third, the researchers did not control for potential biases during the study duration. Using a single research team might have favored outcome measures at Year 1 and Year 2 follow-ups. Using self-reported measurements (PDQ-39 and fall history) inherently exposed the study to recall and memory bias. Last, the researchers did not consider the timing of the intervention to account for the normal aging process and progressive course of PD.

CONCLUSIONS

Combining regular exercise with an individualized movement program has the ability to maximize the quality of life for individuals with PD by reducing fall risk, improving mobility, and increasing function. The longitudinal study design enabled the researchers to measure the effect of weekly versus biweekly rehabilitation programs. Outcome measures at Year 1 and Year 2 showed that weekly rehabilitation sessions can have a significant impact on fall risk, hospitalization, and quality of life, as compared with biweekly sessions. Further research can investigate the effectiveness of a regular exercise and movement-strategies

program using a randomized controlled study design in different clinical settings. Measuring the impact of these interventions on fall risk, mobility, hospitalization, and quality of life may provide useful information for treating individuals with PD.

This work is based on the evidence-based literature review completed by April Perez, OTS, Morganne Peterson, OTS, Raechel Jacala, OTS, and Kitsum Li, OTD, OTR/L, CRCS, faculty advisor, Dominican University of California.

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